

# **Phoenix Park Habitat Management Plan**

**Report commissioned by**

**The Office of Public Works**

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## Summary

This report provides an account of habitats and recommendations for management to retain and enhance their plant and animal diversity. It is based on fieldwork, a review of specialist reports prepared by other ecologists and discussions between the ecologists who carried out research to inform the Conservation Management Plan.

Habitat mapping confirmed the importance of the Park to biodiversity in Dublin City. Buildings and roads cover 45% of Dublin City. In the park they cover 7%. Woodlands and tree dominated areas cover 30% or 220ha and grasslands cover 56% or 398ha. There are twenty five different habitats including six types of woodland, five types of grassland, as well as hedgerows, scrub, ponds, stream and wet ditches. Semi-natural *Dry calcareous and neutral grassland* (GS1) is the commonest habitat (29%) followed by *Scattered Trees and Parkland* (16%) and *(Mixed) Broadleaved Woodland* (14%). Almost all the semi-natural grassland in Dublin is found in the Phoenix Park. The park provides the only location for semi natural *Oak-ash-hazel Woodland* in the city and throughout the remainder of the wooded areas native Oak (*Quercus robur*) is the commonest tree. The most valuable habitats are semi-natural wet and dry grasslands and woodland. Three legally protected plants have been found within these habitats. The high cover of semi-natural habitats accounts for the wide diversity of animal species found in the Park's grasslands, woodlands and wetlands. This biodiversity results from its continuous management over hundreds of years for farming, forestry, deer keeping and amenity. Management recommendations for habitats recognise the importance of its landscape heritage and amenity values. The plan lists thirty-four actions to implement the following overall objectives:

To continue to adopt management measures sensitive to biodiversity, to identify areas where such measures would have precedence and to develop action plans to maximise biodiversity in these area.

To raise awareness of biodiversity and produce guidelines on biodiversity management in co-operation with all stakeholders, institutions and residents.

To protect and enhance the condition of rare and important species of flora and fauna.

To continue research and development and monitoring on all aspects of biodiversity, in order to support the decision making process in management practices for the overall enhancement of biodiversity.

Actions are grouped under the following themes: Habitat and species diversity, woodland, grassland and wetland management, mammals and birds and research, monitoring and education

# **1 Methodology**

## **1.1 Habitat map**

Habitats were mapped during the summer of 2007 using the classification system and mapping guidelines promoted by the Heritage Council (Fossitt, 2000 and Habitat Mapping Guidelines 2005). Detailed plant lists were compiled at fifty-seven locations. A digital habitat map was produced to which these species lists were linked. A sub-category of Wet Grassland (as GS4\*) was mapped to identify the most species rich examples of this habitat. The habitat category Ornamental/non-native shrub (WS3) was mapped both by area and as a linear feature. A map of habitats is an important aid to describing and evaluating biodiversity in the park. Rare habitats can be identified. The results of surveys of specialist groups can be linked to particular habitats and thus management guidelines to enhance both plant and animal biodiversity can target locations known to both managers and ecologists.

## **1.2 Management plan**

Management plan objectives were based on an examination of the results of all field studies commissioned by the OPW, consultations and desk research. Surveys include Crowe (2008), Naulty et al. (2007), Caffrey et al. (2008), Meehan, (2007) and ScottCawley (2007).

The results of the consultation process organised by the OPW (workshops for the public, invitation to make written submissions) were reviewed for references to biodiversity. Discussion of biodiversity related issues at meetings of the Conservation Management Plan Advisory Committee were informed by briefing papers, maps and presentations.

Two research theses which focused on the Park provided valuable background information (McCullen, 2006 and Byrne, 1996) the former because of its focus on landscape history and the latter for its account of grasslands in the park. The results of a soils mapping project (Collins, 1974) were incorporated into the geodiversity assessment (Meehan, 2007). The publication **Wild Plants of the Phoenix Park** (Reilly et al, 1993) based on recording by botanists associated with the Dublin Naturalists Field Club provides a historical review of botanical recording, checklists of flowering plants, bryophytes and trees and notes on the flora associated with different parts of the Park. This publication listed 345 flowering plant species. A survey of semi-natural grasslands in Dublin City (Lyons and Tubridy, 2007) enabled some of the Parks grassland to be evaluated in a city context.

Direct consultations took place with officials from National Parks and Wildlife Service during a site visit. All ecologists involved in field studies in the park, park managers, and an official from NPWS took part in a facilitated workshop to discuss priorities for management. A copy of the habitat map, an account of habitats and list of issues were circulated prior to the workshop.

## 2 Habitats

### 2.1 Introduction

Table 1 describes the relative the cover of (non linear) habitats in the park. Habitat names and codes follow Fossitt (2000).

**Table 1**      **Habitat Areas**

<b>Habitat Code and Title</b>	<b>Hectares</b>	<b>Percentage Area</b>
GS1 Dry Calcareous and Neutral Grassland	206.48	29.42
GA2 Amenity Grassland	144.71	20.62
WD5 Scattered Trees and Parkland	112.68	16.06
WD1 (Mixed) Broadleaved Woodland	96.18	13.71
BL3 Buildings and Artificial Surfaces	54.48	7.76
GS4 Wet Grassland	42.85	6.11
WS1 Scrub	9.18	1.31
FL8 Other Artificial Lakes and Ponds	7.06	1.01
WS2 Immature Woodland	6.47	0.92

**Table 1 (contd). Habitat Areas**

Habitat Code and Title	Hectares	Percentage Area
WD3 (Mixed) Conifer Woodland	5.75	0.82
WD2 Mixed Broadleaved/Conifer Woodland	3.64	0.52
GA1 Improved Agricultural Grasslands	2.60	0.37
BC4 Flower Beds and Borders	2.31	0.33
WS3 Ornamental/ Non-native Shrub	1.61	0.23
ED2 Spoil and Bare Ground	1.02	0.15
WN2 Oak-ash-hazel Woodland	1.02	0.15
GS4* Wet Grassland (high quality)	1.34	0.19
ED3 Recolonising Bare Ground	0.89	0.13
GM1 Marsh	0.68	0.10
GS2 Dry Meadows and Grassy Verges	0.59	0.08
WD4 Conifer Woodland	0.24	0.03

Linear habitats also shown on the habitat map include *Hedgerows* (WL1), *Treelines* (WL2), *Drainage Ditches* (FW4), *Stone Walls* (BL1), *Earth Banks* (BL2) and linear *Shrubberies* (WS3).

Twenty five different habitats are found. Semi-natural habitats dominate. Semi-natural *Dry calcareous and neutral grassland* (GS1) is the commonest habitat (29%) followed by *Scattered Trees and Parkland* (16%) and *(Mixed) Broadleaved Woodland* (14%). A comparison between the nature and distribution of habitats in the Park and Dublin City (Appendix 1) reveals the significance of the Park to biodiversity in Dublin. Almost all the semi-natural grassland in Dublin is found in the Phoenix Park. The park provides the only location for semi natural *Oak-ash-hazel Woodland* in the city.

Important features of habitat biodiversity are:

1 Species rich grassland (GS1) along steep terraces on the south side of the park, the flora which includes Hairy Violet (*Viola hirta*), a protected species. The most valuable grasslands are those which has not been ploughed or improved.

2 Wet grassland, particularly the wettest area south of the Quarry (or Island) Lake where the flora contains another protected plant, the grass Meadow barley (*Hordeum secalinum*). Wet grassland is rare in Dublin.

3 Small area of semi-natural oak ash woodland (0.5ha) dominated by Ash near the Furry Glen.

4 The presence of a type of planted broadleaved woodland (WD1) which has been categorised as “wood pasture” in the United Kingdom. This has not been characterised in Ireland. It is recognized in the UK as a priority habitat (wapis.org.uk). Its principal characteristics are the absence of a shrub layer and abundance of woodland grass species due to grazing pressure.

5 The presence of all other semi-natural habitats is important in the park, as they are rare in Dublin. These include all the other remaining wetlands, other woodlands

Fieldwork confirmed the presence of the legally protected Hairy Violet (*Viola hirta*) mentioned in Reilly et al. (1993), Hairy St John’s-wort (*Hypericum hirsutum*) last seen in the 18<sup>th</sup> century (Reilly op. cit.) and revealed the presence of the legally protected Meadow Barley (*Hordeum secalinum*) for the first time. These plants are listed in the Flora (Protection) Order 1999 made under the Wildlife Act 1976 (S.I. No. 94 of 1999).

## 2.2 Wetland habitats

### 2.2.1 Flora

Wetlands in the park include artificial lakes, streams, drainage ditches and a small area of marsh.

All the lakes in the Park are artificial creations. They include the Furry Glen or Glen pond, Quarry or Island Lake, Citadel or Dog Pond, the Machine pond, the Peoples Garden pond, ponds in the Zoo and a small lake in the grounds of Arus an Uachtaráin. Emergent species found generally in these water bodies include Gipsywort (*Lycopus arvensis*), Reed Canary-grass (*Phalaris arundinacea*), Water Forget-me-not (*Myosotis scorpioides*), Water Mint (*Mentha aquatica*), Wild Angelica (*Angelica sylvestris*), Meadow-sweet (*Filipendula ulmaria*), Great Willow-herb (*Epilobium hirsutum*) and Wild Iris (*Iris pseudacorus*). Uncommon species include Bulrush (*Typha latifolia*) at the Citadel or Dog Pond, Mare’s-tail (*Hippuris vulgaris*) and Water Plantain (*Alisma plantago-aquatica*) in the lake at Arus an Uachtaráin while Amphibious Bistort (*Persicaria amphibia*) occurs at both localities. Few non-native invasives are present. The Furry Glen pond has a number of uncommon aquatic species including Reed Sweet-grass (*Glyceria maxima*) and Yellow Water Lily (*Nuphar lutea*) the latter also occurring at Quarry Lake. The presence of *Chara* sp in four ponds (Aras, People’s Garden, Dog and Island) is an indicator of good water quality. No submerged flowering plants were recorded in the lower ponds in the Zoo.

Because of the heavy drift which comprises a large part of the northern area of the Phoenix Park an extensive drainage system was laid out in the park in the early to mid 19<sup>th</sup> century (McCullen, 2007). This comprises a system of underground drains and some artificial surface streams. As a result the area of wetland declined. However linear wetlands have continued to survive in many man made or modified locations. The “ha-ha’s” around the Ordnance Survey, Visitor Centre, Aras, Civil Defence grounds and US US Ambassador’s residence support water all year round. The beds and sloping clayey sides of these channels provide valuable niche habitats for a variety of wetland plants. Common plants include Fool’s-water-cress (*Apium nodiflorum*), Curled Dock, (*Rumex crispus*), Common Water-cress (*Rorippa nasturtium-aquaticum*), Knotted Figwort (*Scrophularia nodosa*), Hemp Agrimony (*Agrimonia eupatoria*), Common Fleabane (*Pulicaria dysenterica*), Brooklime (*Veronica beccabunga*), Wild Angelica (*Angelica sylvestris*), Hairy Sedge (*Carex hirta*), Remote Sedge (*Carex remota*), Floating Sweet-grass (*Glyceria fluitans*) and Plicate Sweet-grass (*Glyceria notata*). Where water levels are relatively high throughout the year as, for example in the open ditch draining Quarry Lake, additional species such as Water Plantain (*Alisma plantago-aquatica*), Branched Bur-reed (*Sparganium erectum*), Pink Water-speedwell (*Veronica catenata*), Common Spike-rush (*Eleocharis palustris*), Wild Iris (*Iris pseudacorus*) and Common Duckweed (*Lemna minor*) are found.

On the northern shore of the Furry Glen pond marsh has developed on silt while in the valley to the south by the outflow stream, a similar habitat is found on wet impermeable clay sheltered between heavily wooded slopes. On the northern shore of the Furry Glen pond there is an extensive willow scrub mainly comprising Grey Willow (*Salix cinerea ssp oleofolia*), with Meadowsweet (*Filipendula ulmaria*), Wild Iris (*Iris pseudacorus*), Water Mint (*Mentha aquatica*), Bittersweet (*Solanum dulcamara*), Gypsywort (*Lycopus europaeus*), Marsh Bedstraw (*Galium palustre*), Wild Angelica (*Angelica sylvestris*), Water Forget-me-not (*Mysotis scorpioides*), Fool’s Water-cress (*Apium nodiflorum*), Greater Willowherb (*Epilobium hirsutum*) Hedge Woundwort (*Stachys sylvatica*) and the characteristic wetland grass species, Creeping Bent (*Agrostis stolonifera*). South of the Furry Glen pond in the marsh/wet grassland is found a flora dominated by Wild Iris (*Iris pseudacorus*), Meadowsweet (*Filipendula ulmaria*), Wild Angelica (*Angelica sylvestris*), Common Nettle (*Urtica dioica*), Hemp Agrimony (*Agrimonia eupatoria*), Dog-rose (*Rosa canina*) and Bramble (*Rubus spp*). Other species include Water Mint (*Mentha aquatica*), Spear Thistle (*Cirsium vulgare*), Creeping Thistle (*Cirsium arvense*), Lesser Burdock (*Arctium minus*), Colt’s-foot (*Tussilago farfara*) and the introduced Butterfly-bush (*Buddleja davidii*).

## 2.2.2 Biodiversity evaluation

The lakes, drainage ditches and streams within the Park provide habitats for a range of plant species, exclusively associated with permanently wet areas. These habitats are rare in Dublin. Of particular value are lakes with varying water depths and unshaded species rich fringing vegetation at their margins.

## 2.3 Grasslands

### 2.3.1 Flora

The influence of topography, soil type, historical drainage works, past management for farming, and current amenity land management accounts for the presence of five types of grassland. The commonest type is *Dry calcareous and neutral grassland* (Fossit GS1). Best examples are on the drier southern slopes of the Park. Typical grass species in this area are Meadow Oat-grass (*Helictotrichon pubescens*), Crested Dog's-tail (*Cynosurus cristatus*), Velvet Bent (*Agrostis canina*), Yellow Oat-grass (*Trisetum flavescens*), Quaking-grass (*Briza media*), Red Fescue (*Festuca rubra*) Heath-grass (*Danthonia decumbens*) and the aggressive species Upright Brome (*Bromopsis erecta*). Other flowering plants include Spring-sedge (*Carex caryophylla*), Crow Garlic (*Allium vineale*), Lady's Bedstraw (*Galium verum*), Salad Burnet (*Sanguisorba minor*), Wild Thyme (*Thymus polytrichus*), Fairy Flax (*Linum catharticum*) and Common Bird's-foot-trefoil (*Lotus corniculatus*). Species richness and rarity at this site in comparison to other sites for GS1 in Dublin was highlighted in Lyons and Tubridy (2007).

A legally protected plant, Hairy Violet (*Viola hirta*), was refound in this habitat at three locations on steep banks between the Furry Glen and the Magazine Fort. Hairy Violet is rare in Ireland being confined to very restricted areas in the Burren, the Aran Islands, Co. Limerick and Co. Dublin. It is associated with well drained tall old calcareous grasslands. Another rare plant, the Autumn Lady's-tresses Orchid (*Spiranthes spiralis*), though not legally protected, was formerly recorded as in this habitat on a dry bank on the south side of the Hurling and Football Grounds. Despite extensive searches over two years it was not refound.

Wet grasslands were identified by the presence of certain grass, rush and sedge species. Wet grassland (GS4) is found not only in depressions but where where drainage systems installed in the 19<sup>th</sup> century have broken down. Species found in this habitat include Tufted Hair-grass (*Deschampsia cespitosa*), Yorkshire Fog (*Holcus lanatus*), Hard Rush (*Juncus inflexus*), Soft Rush (*Juncus effusus*), Compact Rush (*Juncus conglomeratus*), Oval Sedge (*Carex ovalis*), Hairy Sedge (*Carex hirta*). Other flowering plants include Silverweed (*Potentilla anserina*), Lesser Stitchwort (*Stellaria graminea*), Common Buttercup (*Ranunculus acris*), Creeping Buttercup (*Ranunculus repens*) and Cuckoo Flower (*Cardamine pratensis*). Tormentil (*Potentilla erecta*) a rare plant within the Phoenix Park (not recorded by Reilly, 1994) but common elsewhere in similar habitats, was noted in two places in the Park.

During this survey a new Dublin locality for a second legally protected plant, Meadow Barley (*Hordeum secalinum*), was discovered in this habitat near Quarry Lake. This plant, a species of undisturbed wet grassland has been found in Dublin in recent years only near the coast. It is very rare elsewhere in Ireland.

Despite the absence of farming some grasslands still have the characteristics of Improved Agricultural Grasslands (GA1). In the absence of fertilizer usage

and under a regime of annual mowing late in the season it is likely that these grasslands will revert to a more natural type.

### 2.3.2 Biodiversity evaluation

Un-improved species rich grasslands (wet and dry) are the most valuable grasslands in the Park. The Park is the principal site for semi -natural grasslands in the city. Their importance and rarity are confirmed by presence of two protected plants, Hairy Violet and Meadow Barley.

## 2.4 Woodlands

### 2.4.1 Flora

Most of the woodland in the Phoenix Park is the result of continuous planting programmes and comprise either *Trees and Parkland* (Fossitt, WD5) or *(Mixed) Broad-leaved Woodland* (Fossitt WD1). Pedunculate Oak (*Quercus robur*) is the commonest tree followed by Beech. Historic records reveal that some form of woodland or scrub has always been present in the park and its vicinity since the 17<sup>th</sup> century. Maps dated 1775 and 1798 (Asser's map and Captain Brown' in Mc Cullen, ?) shows extensive plantations in areas such as the Aras or grasslands which support trees. Principally because of the effects of deer grazing, but also the dense planting of trees and the presence of Holm Oak (*Quercus ilex*) a shrub layer is non-existent in most woodlands. Exceptions to this are the woodlands in the US Ambassadors residence from which deer are excluded. Woodlands whose structure is determined by deer grazing and are grassland like approximate to "wood pasture" a vegetation category applied in the United Kingdom. This type of woodland is a priority habitat in the UK valued for its invertebrates, bats and lichens (Harding and Rose, 1986) but has not been described in Ireland. It can be expected that many of the old Oak trees in the park are important habitats (roosting sites) for bats and invertebrates.

Woodlands at the southern side of the Park in the vicinity of the Furry Glen are richer in woodland species as these are grazed less by deer. In this area a semi-natural type is found (WN2) dominated by Ash. This has spread naturally from quarries/sand and gravel pits which operated in the 19<sup>th</sup> century.

Grass species in woodlands include False Brome (*Brachypodium sylvaticum*), Hairy Brome (*Bromopsis ramosa*) and Giant Fescue (*Festuca gigantea*). Other flowering species found less commonly in woodlands include Wood Sedge (*Carex sylvatica*), Wood Avens (*Geum urbanum*), Lords-and-Ladies (*Arum maculatum*), Ramsons (*Allium ursinum*) and Herb-Robert (*Geranium robertianum*). Indicators of old woodland were found in a few locations such as Field-rose (*Rosa arvensis*), Wood Melick Grass (*Melica uniflora*), Goldilocks (*Ranunculus auricomus*), Yellow Pimpernel (*Lysimachia nemorum*), Bugle (*Ajuga reptans*), Ivy Broom-rape (*Orobanche hederarum*) and Gromwell (*Lithospermum officinale*), the latter being a comparatively rare and declining species in County Dublin and elsewhere. Within the Park, Gromwell occurs in woodland at Quarry Lake and on grassy banks in the vicinity of the Furry Glen. Ferns noted in woodlands include Male-fern (*Dryopteris filix-mas*),

Hart's-tongue (*Phyllitis scolopendrium*), Broad Buckler-fern (*Dryopteris dilatata*) and Soft Shield-fern (*Polystichum setiferum*).

The most interesting and protected woodland plant, Hairy St John's-wort (*Hypericum hirsutum*), was found in woodland in the grounds of Arus an Uachtaráin. This is the first sighting of this plant in the Phoenix Park since the first half of the 18<sup>th</sup> century. In Ireland this species is confined to the Liffey valley in Dublin apart from an isolated occurrence in County Armagh.

Extensive planted hawthorn shrubberies (WS1) are found on the south side of the park. Gorse also provides another type of scrub habitat. Hawthorn plantations were established by Decimus Burton in the 19<sup>th</sup> century. Such plantations are rare in Ireland.

The habitat category *Scattered Trees and Parkland* (WD5) describes the type of vegetation associated with important avenues such as Chesterfield Road and trees scattered through grassland in the park .

Hedgerows were cleared from the park by Decimus Burton to improve visual amenity values. This habitat is still seen between the Park and Farmleigh

#### **2.4.2 Biodiversity evaluation**

Most valuable woodland for biodiversity is the ash dominated type in the Furry Glen where grazing pressure is low and a shrub layer is present. The woodland in the Aras which supports Hairy St Johns Wort is also valuable. Because of the absence of deer grazing within this enclosure it has potential to be developed as a more natural type.

## **3 Habitat Management Plan**

### **3.1 Objectives**

The overall objective is to secure and sustain the biodiversity value of the Phoenix Park into the future, by protecting key habitats and species, enhancing their status, recreating valuable wildlife habitats and introducing appropriate species to increase the biodiversity value of the Park and its habitats.

Strategic objectives for biodiversity include:

- 1: To continue to adopt management measures sensitive to biodiversity, to identify areas where such measures would have precedence and to develop action plans to maximise biodiversity.
- 2: To raise awareness of biodiversity and produce guidelines on biodiversity management in co-operation with all stakeholders, institutions and residents.
- 3: To protect and enhance the condition of rare and important species of flora and fauna.
- 4: To continue research and development and monitoring on all aspects of biodiversity, in order to support the decision making process in management practices for the overall enhancement of biodiversity.

### **3.2 Short-to-medium term actions**

The following are identified as actions to be commenced in the short-to-medium term (5 to 10 years). Some measures will continue to be implemented as long-term actions.

#### **3.2.1 Habitat and species diversity**

Action.1 Develop management measures that are sensitive to biodiversity, including the identification of sanctuary areas in which such measures would take precedence.

Action 2: Develop management prescriptions to ensure survival and propagation of rare plants - Hairy St Johns Wort, Hairy Violet and Meadow barley.

Action 3: Consider planting native woodlands in grasslands, which are becoming rank (mapped as GS2 type in the habitat map) where this does not conflict with the objective to protect and enhance the historic landscape.

Action 4: Adopt a long-term land use/landscaping strategy, which will aim to maintain and improve connectivity between similar habitats and encourage suitable species back into the Park.

Action.5: Improve the cover of habitats, which would support greater diversity such as native woodlands, shrubberies and wetlands.

### **3.2.2 Grassland management**

Action 6: Adopt the principles (given suitable climatic and ground conditions), of cutting the grass as late as possible within the season, extending the hay making to the optimum area possible and minimising mulching in species rich grassland, to maximise floristic diversity (reduce fertility) and to provide food and nesting sites for birds.

Action 7: Vary cutting regimes in grassland areas near other habitats to increase diversity, particularly invertebrate diversity.

Action 8: In the medium term, encourage restoration of grazing in the various enclosures, or the planting of spring cereals to provide food for birds, small mammals. Grassland relevés, previously surveyed by Byrne ( ? ) should be resurveyed to discover changes in species and cover in high value areas.

Action.9: Continue removal of undesirable species of plants such as ragwort through manual & organic means.

### **3.2.3 Woodland management**

Action.10: Undertake a woodland ecological survey.

Action 11: In anticipation of Action 10, and as preliminary guidelines only:

- Fence off rare semi-natural woodland (ash dominated in the Furry Glen) and nearby rabbit warren.

- Fence off other recently established WD1's (planted woodlands) with potential for naturalness in the Park.

- Assess and manage demesne woodlands to the appropriate requirements, planting natives where possible.

- Establish more native woodlands where possible, in keeping with the historic landscape.

- Leave trees to die naturally, leave deadwood on site (in selected areas) where there is no danger to park users.

- Leave ivy on trees unless this impacts on the safety of the tree.

- Identify blocks to be felled, fenced off, linked or supplemented with native trees and shrubs.

- Consider planting sacrificial species (bramble) to lessen the browsing impact of deer on trees.

- Increase area of semi-natural woodland to maximise connectivity and by expanding adjacent to existing old woodland.

Action 12: Initiate research on "wood pasture" and invertebrates associated with old trees.

Action 13: Control vermin such as the grey squirrel (who damage 80% of all newly planted trees.)

### **3.2.4 Wetland management**

Action 14: Examine watercourses and water bodies to identify opportunities for enhancement of landscape quality and biodiversity by:

Re-instating open, naturalistic channels.

Dredging heavily silted water bodies to restore open water and form naturalistic margins.

Thinning or removing overly dense tree canopies to promote increased growth of emergent vegetation.

Examine the feasibility of re-profiling work in the Citadel Pond (too shallow) and around the Machine Pond and Quarry Lake to create better quality semi-wetland habitat.

Action 15: Apply SUDS (Sustainable Urban Drainage Systems) principles to improve the management of run off from hard surfaces.

Action 16: Consider the feasibility of constructed wetland systems, to improve water quality taking into account the historic landscape setting.

Action 17: Develop fishery potential of ponds.

Action 18: Examine local aquifer in terms of volume and quality with a view to developing an independent water supply and good quality wetland habitat.

### **3.2.5 Mammals and birds**

Action 20: Maintain the optimum deer population for sustainability, nature and landscape conservation and continue to monitor and manage the deer population.

Action 21: Map all badger setts and provide guidelines for works in their vicinity.

Action 22: Identify breeding areas for ground nesting birds in grasslands through a further stage of survey work

Action 23: Secure appropriate mowing regimes in areas identified under

Action 24 Seek to increase areas of natural shrubberies, bramble and nettles.

Action 25: When reconstructing buildings consider the installation of bird nest boxes and bat boxes.

Action 26: Continue survey of potential bat roost sites and adopt best practice in construction, building restoration and tree felling to protect bats.

### **3.2.6 Research, monitoring and education**

Action 27: Research sources of water for all ponds and establish condition of water before entering the Park and when it leaves.

Action 28: Research feasibility of re-introducing certain mammal and bird species such as red squirrel and owl to the Park.

Action 29: Monitor biodiversity on a regular basis using results of baseline surveys for the management plan. Develop indicators to record change in the biodiversity value of the Park.

Action 30: Continue research on the biodiversity of park woodlands, veteran trees and old semi natural hawthorn shrubberies.

Action 31: Record and monitor the effects on biodiversity of any new management initiatives.

Action 32: Establish a liaison with the National Biodiversity Records Centre.

Action 33: Produce guidelines on biodiversity management for Park enclosures and continue to develop biodiversity training for all relevant personnel.

Action 34: Develop links with biodiversity and management specialists in NGOs, local authorities, state agencies and research institutions and managers of similar parks worldwide to promote awareness, provide access to research and allow exchange of experience.

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## **APPENDIX 1**

### **Habitats in Dublin City: Summary information from studies of habitat diversity (Compass Ltd and Tubridy and Associates 2003)**

- Thirty five habitats.
- Commonest habitat type is associated with buildings and artificial surfaces (BL3). This covers 45% of the city. Using GIS it was divided into roads (30%) and buildings (15%).
- Gardens occupy 25%.
- Green spaces take up 20%.
- Within these green spaces amenity grassland (GA) is the commonest habitat type (12.34%).
- Habitats of particular biodiversity value cover 8% of the city. They include

Semi-natural grasslands (GS)	5.01%
Modified woodland (WD)	2.06%
Canals (FW3)	0.30%
Rivers (FW2)	0.33%
Brackish waters (CW)	0.32%
Hedgerows (WL1)	0.27%
Scrub (WS1)	0.02%
Sand dune systems (CD)	0.01%
Reed and large herb swamps (FS1)	0.001%
Ponds (FL8)	0.0002%